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HOW MANY WIRELESS SENSORS ARE NEEDED TO GUARANTEE CONNECTIVITY OF A ONE-DIMENSIONAL NETWORK WITH RANDOM INTER-NODE SPACING?

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SUMMARY

An important problem in wireless sensor networks is to find an optimal number of randomly deployed sensors to guarantee connectivity of the resulting network with a given probability. The authors describe a general method to compute the probabilities of connectivity and coverage for one-dimensional networks with arbitrary densities of inter-node spacings. A closed formula for the probability of connectivity is derived when inter-node spacings have arbitrary different piecewise constant densities. Explicit estimates for a number of sensors to guarantee connectivity of the network are found for constant and normal densities.

Keywords and phrases: wireless sensor network; connectivity; probability; density.

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